REMARKS

Claims 1-13 are pending in the Application. Claims 1-13 are rejected under 35 U.S.C. §103(a). Applicants respectfully traverse these rejections for at least the reasons stated below and respectfully request that the Examiner reconsider and withdraw these rejections.

I. REJECTIONS UNDER 35 U.S.C. §103(a):

The Examiner has rejected claims 1-13 under 35 U.S.C. §103(a) as being unpatentable over Heckerman (U.S. Patent No. 6,529,891) in view of Yet et al. (U.S. Patent No. 6,295,504) (hereinafter "Ye"). Applicants respectfully traverse these rejections for at least the reasons stated below and respectfully request the Examiner to reconsider and withdraw these rejections.

A. Heckerman and Ye, taken singly or in combination, do not teach or suggest the following claim limitations.

Applicants respectfully assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining a foreground frequency of a bucket within a first cluster" as recited in claim 1 and similarly in claim 13. The Examiner cites Figures 2, 12, 14 and 29; column 5, lines 40-67 and column 6, lines 1-40 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 3. Applicants respectfully traverse and assert that Heckerman teaches a database that contains attribute-value pairs for a number of users. Column 5, lines 57-58. Heckerman further teaches that an attribute is a variable or distinction, such as a user's age, gender or income, for predicting user preferences. Column 5, lines 59-60. Heckerman further teaches a value is an instance of the variable. Column 5, lines 60-61. Heckerman further teaches that a collaborative filtering system uses any of a number of well-known clustering algorithms to divide the database into a number of clusters. Column 6, lines 39-41. Hence, Heckerman teaches a database that contains attribute-value pairs where an attribute is a variable for predicting user preferences. However, there is no language in the cited passages that teaches determining a foreground frequency of a bucket within a cluster. Therefore, the Examiner has not

presented a *prima facie* case of obviousness in rejecting claims 1 and 13, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining a background frequency of the bucket with respect to all of the clusters" as recited in claim 1 and similarly in claim 13. The Examiner cites column 7, lines 20-52; column 8, lines 1-8; and column 13, lines 10-58 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 3. Applicants respectfully traverse and assert that Heckerman instead teaches that the invention automatically determines the number of clusters using an array of Bayesian networks. Column 7, lines 20-21. Heckerman further teaches that the MBN structure is initialized as a collection of identical HSBNs whose discrete hidden variables are connected to all observed variables and whose continuous hidden variables are connected to all observed variables and whose continuous hidden variables are connected only to each of the continuous observed variables, the directionality being from hidden variable to observed variable. Column 8, lines 1-7. Heckerman further teaches that the process for learning MBNs include several advantageous features including: (a) interleaving parameter and structural search, (b) expected complete model sufficient statistics, and (c) an outer loop for determining the number of states of the discrete hidden variables. Column 13, lines 11-16. There is no language in the cited passages that teaches determining a background frequency of the bucket. Neither is there any language in the cited passages that teaches determining a background frequency of the bucket with respect to all of the clusters. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claims 1 and 13, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "comparing the foreground and background frequencies" as recited in claim 1 and similarly in claim 13. The Examiner cites

column 37, lines 10-67 and column 38, lines 1-20 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 3. Applicants respectfully traverse and assert that Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37, lines 10-15. Heckerman further teaches that the number of states of each hidden discrete variable in each HSBN are optimized for that HSBN (i.e., for the corresponding hypothesis that C is in the corresponding one of its states), a significant advantage. Column 38, lines 1-5. There is no language in the cited passages that teaches comparing the foreground and background frequencies. Applicants respectfully request the Examiner to more particularly point out in the cited passages where a foreground frequency is taught pursuant to 37 C.F.R. §1.104(c)(2). Further, Applicants respectfully request the Examiner to more particularly point out in the cited passages where a background frequency is taught pursuant to 37 C.F.R. §1.104(c)(2). Further, Applicants respectfully request the Examiner to more particularly point out in the cited passages where a comparison between a foreground frequency and a background frequency is taught pursuant to 37 C.F.R. §1.104(c)(2). Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claims 1 and 13, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining a quality index based on the comparison" as recited in claim 1 and similarly in claim 13. The Examiner cites the Abstract; column 13, lines 18-30; column 14, lines 15-22; column 15, lines 55-65 and column 16, lines 35-50 of Ye as teaching the above-cited claim limitation. Paper No. 7, page 4. Applicants respectfully traverse. Ye instead teaches an apparatus and method for obtaining facies of geological formations for identifying mineral deposits. Abstract. Ye further discloses that for well-separated cluster data sets that contain a significant probability density difference between modes and valleys, the number of

clusters can be easily identified. Column 13, lines 18-20. Ye further teaches that the drop points of the curve can be automatically detected by the peaks of the gradient (the first derivative) of the decreasingly order KRI curve. Column 14, lines 15-17. Ye further teaches that because the new measurement data might not fit the model data, quality control while gathering log data measurements is very important for correct model propagation. Column 15, lines 55-57. Ye further teaches that for an electrofacies model made by N logs (and thus of N data dimensions) and an application data set with N-R logs available, where R is the number of logs which are not available in the application data set, the nearest neighbor propagation method preferably assigns for each application data point the electrofacies of its nearest neighbor in the reference data set while ignoring the R unavailable logs of the reference data set. Column 16, lines 36-43. There is no language in the cited passages that teaches determining a quality index. Neither is there any language in the cited passages that teaches determining a quality index based on the comparison between the foreground and background frequencies. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claims 1 and 13, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining a quality index for each result of the data clustering operations" as recited in claim 10. The Examiner cites the Abstract; column 13, lines 18-30; column 14, lines 15-22; column 15, lines 55-65 and column 16, lines 35-50 of Ye as teaching the above-cited claim limitation. Paper No. 7, page 6. Applicants respectfully traverse. Ye instead teaches an apparatus and method for obtaining facies of geological formations for identifying mineral deposits. Abstract. Ye further discloses that for well-separated cluster data sets that contain a significant probability density difference between modes and valleys, the number of clusters can be easily identified. Column 13, lines 18-20. Ye further teaches that the drop points of the curve can be automatically detected by the peaks of the gradient (the first derivative) of the decreasingly order KRI curve. Column 14, lines 15-17. Ye further teaches that because the new measurement data might not fit the model

data, quality control while gathering log data measurements is very important for correct model propagation. Column 15, lines 55-57. Ye further teaches that for an electrofacies model made by N logs (and thus of N data dimensions) and an application data set with N-R logs available, where R is the number of logs which are not available in the application data set, the nearest neighbor propagation method preferably assigns for each application data point the electrofacies of its nearest neighbor in the reference data set while ignoring the R unavailable logs of the reference data set. Column 16, lines 36-43. There is no language in the cited passage that teaches determining a quality index. Neither is there any language in the cited passage that determines a quality index for each result of the data clustering operations. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 10, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "selecting the result with the highest quality index as an end result of the data clustering" as recited in claim 10. The Examiner cites column 19, lines 40-67 and column 21, lines 12-35 of Heckerman teachings the highest quality index as an end result of the data clustering. Paper No. 7, page 6. Applicants respectfully traverse.

Heckerman instead teaches computing the expected complete-model sufficient statistics (ECMSS). Column 19, lines 41-42. Heckerman further teaches that the ECMSS are then translated using conventional techniques into expected sufficient statistics, sample means, scatter matrix and sample size. Column 21, lines 14-19. There is no language in the cited passages in Heckerman that teaches selecting a result with a highest quality index. Neither is there any language in the cited passages in Heckerman that teaches selecting a result with a highest quality index as an end result of a data clustering. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 10, since the Examiner is relying upon an

incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining a quality index for the clusters" as recited in claim 11. The Examiner cites the Abstract; column 13, lines 18-30; column 14, lines 15-22; column 15, lines 55-65 and column 16, lines 35-50 of Ye as teaching the above-cited claim limitation. Paper No. 7, page 6. Applicants respectfully traverse. Ye instead teaches an apparatus and method for obtaining facies of geological formations for identifying mineral deposits. Abstract. Ye further discloses that for well-separated cluster data sets that contain a significant probability density difference between modes and valleys, the number of clusters can be easily identified. Column 13, lines 18-20. Ye further teaches that the drop points of the curve can be automatically detected by the peaks of the gradient (the first derivative) of the decreasingly order KRI curve. Column 14, lines 15-17. Ye further teaches that because the new measurement data might not fit the model data, quality control while gathering log data measurements is very important for correct model propagation. Column 15, lines 55-57. Ye further teaches that for an electrofacies model made by N logs (and thus of N data dimensions) and an application data set with N-R logs available, where R is the number of logs which are not available in the application data set, the nearest neighbor propagation method preferably assigns for each application data point the electrofacies of its nearest neighbor in the reference data set while ignoring the R unavailable logs of the reference data set. Column 16, lines 36-43. There is no language in the cited passages that teaches determining a quality index. Neither is there any language in the cited passages that teaches determining a quality index for the clusters. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 11, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "performing a number of iterations to improve

the quality index" as recited in claim 11. The Examiner cites column 37, lines 8-35 of Heckerman as teaching performing a number of iterations. Paper No. 7, page 7. Applicants respectfully traverse and assert that Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C and then determining from the comparative scores which choice was correct. Column 37, lines 9-14. There is no language in the cited passage that teaches performing a number of iterations to improve the quality index. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 11, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Claims 2-9 recite combinations of claim 1 and thus are patentable over Heckerman in view of Ye for at least the above-stated reasons that claim 1 is patentable over Heckerman in view of Ye. Claim 12 recites combinations of claim 11 and thus is patentable over Heckerman in view of Ye for at least the above-stated reasons that claim 11 is patentable over Heckerman in view of Ye. Claims 2-9 and 11 recite additional features, which, in combination with the features of the claims upon which they depend, are not patentable over Heckerman in view of Ye.

For example, Heckerman and Ye, taken singly or in combination, do not teach or suggest "wherein said comparing step further comprises subtracting the relative foreground and background frequencies" as recited in claim 2. The Examiner cites column 37, lines 10-67 and column 38, lines 1-20 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 4. Applicants respectfully traverse and assert that Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37, lines 10-15. Heckerman further teaches that the number of states of each hidden discrete variable in each HSBN are optimized for that HSBN (i.e., for the corresponding hypothesis that C is in the corresponding one of its states), a significant

advantage. Column 38, lines 1-5. There is no language in the cited passages that teaches the relative foreground and background frequencies. Neither is there any language in the cited passages that teaches subtracting the relative foreground and background frequencies. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 2, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "squaring the result of the comparison" as recited in claim 3. The Examiner cites column 14, lines 20-30 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 4. Applicants respectfully traverse and assert that Heckerman instead teaches that the vector $T(X_{case})$ consists of m triples, where m is the number of possible discrete configurations for the discrete variables Δ. Column 14, lines 20-22. There is no language in the cited passage that teaches squaring the result of comparing the foreground and background frequencies. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 3, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining an optimal number of clusters; and comparing the optimal number of clusters to the actual number of clusters resulting from the clustering data processing operation" as recited in claim 4. The Examiner cites column 37, lines 8-55; column 39, lines 30-45; column 41, lines 46-67 and column 42, lines 1-8 of Heckerman s teaching the above-cited claim limitations. Paper No. 7, pages 4-5. Applicants respectfully traverse.

Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37,

lines 9-14. Heckerman further teaches to choose the number of possible states for the variables C and Hd. Column 38, lines 30-31. Heckerman further teaches determining which elements are to be included in the sum over all cases in order to compute the expected count for a particular state of a particular variable. Column 41, lines 47-51. There is no language in the cited passages that teaches determining an optimal number of clusters. Neither is there any language in the cited passages that teaches comparing an optimal number of clusters to the actual number of clusters. Neither is there any language in the cited passages that teaches comparing an optimal number of clusters to the actual number of clusters resulting from the clustering data processing operation. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 4, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "wherein the optimal number of clusters is determined by a maximum number of buckets for a variable" as recited in claim 5. The Examiner cites Figures 31 and 32 as well as column 40, lines 10-50 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 5. Applicants respectfully traverse and assert that Heckerman instead illustrates the learning process for determining the number of clusters (states of C) and the number of states of all hidden discrete variables H in a single pass. Column 40, lines 9-12. There is no language in the cited passage that teaches that the optimal number of clusters is determined by a maximum number of buckets for a variable. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 5, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "wherein the optimal number of clusters is set to a threshold value in case the maximum number of buckets is greater than the threshold number" as recited in claim 6. The Examiner cites column 40, lines 10-65

of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 5. Applicants respectfully traverse and assert that Heckerman instead illustrates the learning process for determining the number of clusters (states of C) and the number of states of all hidden discrete variables H in a single pass. Column 40, lines 9-12. Heckerman further teaches that for each sample size in C less than a predetermined threshold, the corresponding state of C is discarded (block 3140). Column 40, lines 27-29. Heckerman further teaches that for each sample size in any variable H less than a predetermined threshold, the corresponding state of that variable H is discarded (block 3150). Column 40, lines 29-32. Heckerman further teaches that at this point the process is finished, and the MBN with the highest score is selected (block 3160). Column 40, lines 32-33. Heckerman further teaches that a significant advantage of the embodiment of FIG. 31 is that there is no outer loop and therefore the computational burden is greatly reduced. Column 40, lines 33-36. Hence, Heckerman teaches when the sample size in any variable H is less than a predetermined threshold, the corresponding state of that variable H is discarded. Similarly, Heckerman teaches that when the sample size in C is less than a predetermined threshold, the corresponding state of C is discarded. There is no language in the cited passages that teaches setting the optimal number of clusters to a threshold value. Neither is there any language in the cited passages that teaches setting the optimal number of clusters to a threshold value in case the maximum number of buckets is greater than the threshold number. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 6, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining a factor based on the optimal number of clusters and the actual number of clusters" as recited in claim 7. The Examiner cites column 13, lines 16-65 and column 40, lines 10-65 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 5. Applicants respectfully traverse and assert that Heckerman instead teaches that the present invention is embodied in a mixture of Bayesian networks, which corresponds to a

graphical model, the cluster variable, is a discrete variable that is not observed, O is a set of observed variables and H is a set of unobserved (hidden) variables. Column 13, lines 17-21. Heckerman further teaches that for each sample size in C less than a predetermined threshold, the corresponding state of C is discarded (block 3140). Column 40, lines 27-29. Heckerman further teaches that for each sample size in any variable H less than a predetermined threshold, the corresponding state of that variable H is discarded (block 3150). Column 40, lines 29-32. Heckerman further teaches that at this point the process is finished, and the MBN with the highest score is selected (block 3160). Column 40, lines 32-33. Heckerman further teaches that a significant advantage of the embodiment of FIG. 31 is that there is no outer loop and therefore the computational burden is greatly reduced. Column 40, lines 33-36. Hence, Heckerman teaches when the sample size in any variable H is less than a predetermined threshold, the corresponding state of that variable H is discarded. Similarly, Heckerman teaches that when the sample size in C is less than a predetermined threshold, the corresponding state of C is discarded. There is no language in the cited passages that teaches determining a factor based on the optimal number of clusters. Neither is there any language in the cited passages that teaches determining a factor based on the actual number of clusters. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 7, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "multiplying the result of the comparison of the relative foreground and background frequencies with the factor" as recited in claim 7. The Examiner cites column 13, lines 16-65 and column 40, lines 10-65 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 5. Applicants respectfully traverse and assert that Heckerman instead teaches that the present invention is embodied in a mixture of Bayesian networks, which corresponds to a graphical model, the cluster variable, is a discrete variable that is not observed, O is a set of observed variables and H is a set of unobserved (hidden) variables. Column 13, lines 17-21. Heckerman further teaches that for each sample size in C less than a

predetermined threshold, the corresponding state of C is discarded (block 3140). Column 40, lines 27-29. Heckerman further teaches that for each sample size in any variable H less than a predetermined threshold, the corresponding state of that variable H is discarded (block 3150). Column 40, lines 29-32. Heckerman further teaches that at this point the process is finished, and the MBN with the highest score is selected (block 3160). Column 40, lines 32-33. Heckerman further teaches that a significant advantage of the embodiment of FIG. 31 is that there is no outer loop and therefore the computational burden is greatly reduced. Column 40, lines 33-36. Hence, Heckerman teaches when the sample size in any variable H is less than a predetermined threshold, the corresponding state of that variable H is discarded. Similarly, Heckerman teaches that when the sample size in C is less than a predetermined threshold, the corresponding state of C is discarded. There is no language in the cited passages that teaches multiplying the result of the comparison of the relative foreground and background frequencies. Neither is there any language in the cited passages that teaches multiplying the result of the comparison of the relative foreground and background frequencies with the factor. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 7, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining a normalizing value being independent of any correlations between fields of the data on which the data processing operation is applied" as recited in claim 8. The Examiner cites column 26, lines 22-67 and column 27, lines 1-28 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 5. Heckerman instead teaches the continuous score process. Column 26, lines 22-67 and column 27, lines 1-28. There is no language in the cited passage that teaches determining a normalizing value being independent of any correlations between fields of the data. Neither is there any language in the cited passages that teaches determining a normalizing value being independent of any correlations between fields of the data on which the data processing operation is applied. Therefore, the Examiner has not presented a *prima*

facie case of obviousness in rejecting claim 8, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "normalizing the result of the comparison of the foreground and background frequencies by means of the normalizing value" as recited in claim 8. The Examiner cites column 26, lines 22-67 and column 27, lines 1-28 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 5. Heckerman instead teaches the continuous score process. Column 26, lines 22-67 and column 27, lines 1-28. There is no language in the cited passage that teaches normalizing the result of the comparison of the foreground and background frequencies. Neither is there any language in the cited passage that teaches normalizing the result of the comparison of the foreground and background frequencies by means of the normalizing value. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 8, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "comparing the background frequencies of the buckets with an imaginary cluster having a foreground frequency of the bucket equal to one" as recited in claim 9. The Examiner cites column 37, lines 10-67; column 38, lines 1-20; and column 41, lines 25-60 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 6. Applicants respectfully traverse and assert that Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37, lines 9-14. Heckerman further teaches that the number of states of each hidden discrete variable in each HSBN are optimized for that HSBN. Column 38, lines 1-5. Heckerman further teaches that each entry in the ECMSS vector T consists of three

elements, namely a scalar, a vector and a matrix. Column 41, lines 26-28. There is no language in the cited passages that teaches comparing the background frequencies of the buckets with an imaginary cluster. Neither is there any language in the cited passages that teaches comparing the background frequencies of the buckets with an imaginary cluster having a foreground frequency of the bucket equal to one. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 9, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants respectfully assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "comparing the background frequencies of the buckets with an imaginary cluster having a foreground frequency of the bucket equal to zero" as recited in claim 9. The Examiner cites column 37, lines 10-67; column 38, lines 1-20; and column 41, lines 25-60 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 6. Applicants respectfully traverse and assert that Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37, lines 9-14. Heckerman further teaches that the number of states of each hidden discrete variable in each HSBN are optimized for that HSBN. Column 38, lines 1-5. Heckerman further teaches that each entry in the ECMSS vector T consists of three elements, namely a scalar, a vector and a matrix. Column 41, lines 26-28. There is no language in the cited passage that teaches comparing the background frequencies of the buckets with an imaginary cluster. Neither is there any language in the cited passage that teaches comparing the background frequencies of the buckets with an imaginary cluster having a foreground frequency of the bucket equal to zero. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 9, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "summing the results of the corresponding comparison values" as recited in claim 9. The Examiner cites column 37, lines 10-67; column 38, lines 1-20; and column 41, lines 25-60 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 6. Applicants respectfully traverse and assert that Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37, lines 9-14. Heckerman further teaches that the number of states of each hidden discrete variable in each HSBN are optimized for that HSBN. Column 38, lines 1-5. Heckerman further teaches that each entry in the ECMSS vector T consists of three elements, namely a scalar, a vector and a matrix. Column 41, lines 26-28. There is no language in the cited passages that teaches summing the results of the comparison values mentioned above. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 9, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "moving at least one record of at least one of the clusters to another cluster" as recited in claim 12. The Examiner cites column 37, lines 10-35 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 9. Applicants respectfully traverse and assert that Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37, lines 9-14. There is no language in the cited passages that teaches moving a record of a cluster to another cluster. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 12, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "determining the quality index for the modified clusters" as recited in claim 12. The Examiner cites the Abstract; column 13, lines 18-30; column 14, lines 15-22; column 15, lines 55-65 and column 16, lines 35-50 of Ye as teaching the above-cited claim limitation. Paper No. 7, page 9. Applicants respectfully traverse. Ye instead teaches an apparatus and method for obtaining facies of geological formations for identifying mineral deposits. Abstract. Ye further discloses that for well-separated cluster data sets that contain a significant probability density difference between modes and valleys, the number of clusters can be easily identified. Column 13, lines 18-20. Ye further teaches that the drop points of the curve can be automatically detected by the peaks of the gradient (the first derivative) of the decreasingly order KRI curve. Column 14, lines 15-17. Ye further teaches that because the new measurement data might not fit the model data, quality control while gathering log data measurements is very important for correct model propagation. Column 15, lines 55-57. Ye further teaches that for an electrofacies model made by N logs (and thus of N data dimensions) and an application data set with N-R logs available, where R is the number of logs which are not available in the application data set, the nearest neighbor propagation method preferably assigns for each application data point the electrofacies of its nearest neighbor in the reference data set while ignoring the R unavailable logs of the reference data set. Column 16, lines 36-43. There is no language in the cited passages that teaches determining a quality index. Neither is there any language in the cited passages that teaches determining a quality index for modified clusters. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 12, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

Applicants further assert that Heckerman and Ye, taken singly or in combination, do not teach or suggest "using the modified clusters as a new initial set of clusters in case the quality index improved" as recited in claim 12. The Examiner cites column 37, lines 10-35 of Heckerman as teaching the above-cited claim limitation. Paper No. 7, page 9. Applicants respectfully traverse and assert that

Heckerman instead teaches that the number of states of the hidden cluster variable C is determined by iterating the parameter and structure search and optimization procedure over the possible choices of the number of states of C, and then determining from the comparative scores which choice was correct. Column 37, lines 9-14. There is no language in the cited passages that teaches using the modified clusters as a new initial set of clusters. Neither is there any language in the cited passages that teaches using the modified clusters as a new initial set of clusters in case the quality index improved. Therefore, the Examiner has not presented a *prima facie* case of obviousness in rejecting claim 12, since the Examiner is relying upon an incorrect, factual predicate in support of the rejection. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998).

As a result of the foregoing, Applicants respectfully assert that there are numerous claim limitations not taught or suggested in the cited prior art, and thus the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 1-13. M.P.E.P. §2143.

B. The Examiner has not provided any objective evidence or source of motivation for combining Heckerman with Ye.

In order to establish a *prima facie* case of obviousness, the Examiner must provide some suggestion or motivation, either in the references themselves, the knowledge of one of ordinary skill in the art, or, in some case, the nature of the problem to be solved, to modify the reference or to combine reference teachings. *See In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999).

The Examiner admits that Heckerman does not teach determining a quality index based on comparing the foreground and background frequencies, as recited in claim 1 and similarly in claim 13. Paper No. 7, page 3. Further, the Examiner admits that Heckerman does not teach determining a quality index for each result of the data clustering operations, as recited in claim 10. Paper No. 7, page 6. Further, the Examiner admits that Heckerman does not teach determining a quality index for the clusters, as recited in claim 11. Paper No. 7, page 7. Further, the Examiner admits that Heckerman does not teach determining the quality index for the modified

clusters, as recited in claim 12. Paper No. 7, page 9. The Examiner's motivation for modifying Heckerman with Ye to include the above-cited claim limitations is "for easing to group clustered data into clusters such that belonging to the same cluster have a high degree of similarity." Paper No. 7, pages 4, 7, 8 and 9. The Examiner's motivation is insufficient to support a *prima facie* case of obviousness for at least the reasons stated below.

The Examiner has not presented a source for her motivation for modifying Heckerman with Ye. As stated above, the Examiner must provide some suggestion or motivation, either in the references themselves, the knowledge of one of ordinary skill in the art, or, in some cases the nature of the problem to be solved, to modify the reference or to combine reference teachings. *See In re Dembiczak*, 175 F.3d 1994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). The Examiner has not provided any evidence that his motivation comes from any of these sources. Applicants respectfully request the Examiner to particularly point out from which of these sources her motivation comes from. The Examiner appears to be relying upon her own subjective opinion which is insufficient to support a *prima facie* case of obviousness. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 1-13. *Id.*

Furthermore, the Examiner's motivation does not address as to why one of ordinary skill in the art would modify Heckerman to include the above-cited claim limitations. Heckerman addresses the problem of that the exact number of clusters is determined manually which renders the algorithm prone to human error. Column 7, lines 10-12. Heckerman further addresses the problem that all attributes are numerical and as such, the values of non-numerical attributes must be transposed into numerical values. Column 7, lines 12-15. Heckerman further teaches that the purpose of the present invention is to improve collaborative filtering systems. Column 7, lines 15-17. The Examiner's motivation does not address as to why one of ordinary skill in the art would modify Heckerman, which teaches to improve collaborative filtering systems overcoming problems, such as determining the exact

number of clusters manually and transposing values of non-numerical attributes into numerical values, to determine a quality index "in order to group clustered data into clusters such that belonging to the same cluster have a high degree of similarity". The Examiner has not provided any rationale in the connection between determining a quality index (missing limitation) for Heckerman with grouping clustered data into clusters such that belonging to the same cluster have a high degree of similarity (Examiner's motivation). The Examiner must provide objective evidence as to why one of ordinary skill in the art would modify Heckerman to include the above-cited claim limitations. *In re Lee*, 61 U.S.P.Q.2d 1430, 1434 (Fed. Cir. 2002). The Examiner is merely relying upon his own subjective opinion which is insufficient to support a *prima facie* case of obviousness. *Id.* Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 1-13. *Id.*

Further, the Examiner's motivation does not address as to why one of ordinary skill in the art would modify Heckerman with Ye to include the above-cited claim limitations. Ye addresses the problem of automatic clustering methods requiring the user to provide an initial number of clusters before processing. Column 3, lines 12-14. Further, Ye addresses the problem of having the identified clusters having shapes that are not geologically meaningful. Column 3, lines 14-18. Ye further addresses the problem of having to manually merge a large number of small clusters based on similar geological characteristics by hand. Column 3, lines 19-22. The purpose of Ye is to develop a system and method that permits automatic clustering of logged data to extract information about the geological facies of the data. Column 3, liens 25-28. The Examiner's motivation ("in order to group clustered data into clusters such that belonging to the same cluster have a high degree of similarity") does not address as to why one of ordinary skill in the art would modify Heckerman (which teaches improving collaborative filtering systems) to determine a quality index, in light of Ye (which teaches permitting automatic clustering of logged data to extract information about the geological facies of the data). The Examiner must provide objective evidence as to why one of ordinary skill in the art would modify Heckerman with Ye to include the above-cited claim limitations. *In re Lee*, 61 U.S.P.Q.2d 1430,

1434 (Fed. Cir. 2002). The Examiner is merely relying upon his own subjective opinion which is insufficient to support a *prima facie* case of obviousness. *Id.*. Consequently, the Examiner's motivation is insufficient to support a *prima facie* case of obviousness for rejecting claims 1-13. *Id.*

II. CONCLUSION

As a result of the foregoing, it is asserted by Applicants that claims 1-13 in the Application are in condition for allowance, and Applicants respectfully request an allowance of such claims. Applicants respectfully request that the Examiner call Applicants' attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining issues.

Respectfully submitted,

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